DOCUMENT RESUME

ED 281 861 TM 870 242

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TITLE Does Practice Make Perfect? The Effects of Repetition on Student Learning.
PUB DATE Apr 87
NOTE 8p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, DC, April 20-24, 1987).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Students; Higher Education; *Learning Strategies; *Learning Theories; Multivariate Analysis; *Reading Ability; *Reading Comprehension; *Recall (Psychology)
IDENTIFIERS Blooms Taxonomy; Nelson Denny Reading Tests; *Repetition Effects

ABSTRACT

Past research shows that repetition results in increased learning. However, it is not clear whether repetition adds more information to memory (quantitative hypothesis), or allows the learner to use a more sophisticated method of encoding (qualitative hypothesis). This study investigates the process and effectiveness of repetition as a study technique. The relationship between college student reading comprehension ability and amount of repetitive reading is studied using Bloom's six levels of cognitive learning. College students in an educational psychology course (n=103) classified as high or low ability readers were randomly assigned to read an article one, two or three times. A test, with questions at different levels of Bloom's cognitive domain, was administered one week later. Results show that repetition increased recall performance. The quantitative hypothesis was supported because there were no significant differential effects of repetition at various levels of learning. Learning improved with increased repetition at all levels of the Bloom cognitive domain. There was a statistically significant increase in learning with increased repetitions at Knowledge-Analysis levels. (JAZ)

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Does Practice Make Perfect?

The Effects of Repetition on Student Learning

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Paper presented at the Annual Meetings of the American Educational Research Association, Washington, D.C., April, 1987

TM 870 242

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Abstract

This study empirically investigated the process and effectiveness of repetition (repeated exposures to learning material) as a study technique. Past research makes it clear that repetition results in increased learning, but it is unclear whether repetition increases overall learning at all levels (quantitative hypothesis) or whether repetition differentially affects levels of learning (qualitative hypothesis). The study used Bloom's six levels of cognitive learning to further investigate the effects of repetition on learning. The results supported the quantitative hypothesis because learning improved generally with increased repetitions (one, two, or three times) at all levels of Bloom's cognitive domain, and there was a statistically significant increase in learning with more repetitions at the Knowledge-Analysis levels.

It is common for a student faced with learning the contents of a reading passage to go over the material several times until it is well understood. Student folklore supports the idea that practice or repetition makes perfect. Verbal-learning research from as early as the 1885 work of Ebbinghaus on list learning has provided strong evidence that repetition of verbal material results in increased performance on tests of memory for that material. However, the exact nature of the process of repetition and why it increases learning is not at all clear.

There are two basic theories about the effects of repetition (e.g., Bromage & Mayer, 1986; Mayer, 1983). The quantitative hypothesis states that repetition serves mainly to add more information to memory. Thus repetition should tend to affect "how much is learned" and should uniformly increase learning on all kinds and types of presented information.

In contrast, the second qualitative hypothesis holds that repetition allows the learner to use a more sophisticated method of encoding or making the passage personally meaningful based on the conceptual framework of the passage. Thus repetition should affect what is learned.

Prose-learning research on the effects of repetition provides a direct way of testing the merits of the quantitative versus qualitative hypothesis. There have been two major attempts to do this. Bromage's (1981) study provides support for the qualitative hypothesis. He found that repetitions of the technical prose (one, two or three times) appear to help students shift attention to information that is central to the outline and content organization of the material.

Mayer (1983) extended Bromage's work by using two new dependent measures of verbal recognition and problem solving along with the previous recall test measure. Mayer also found that the content and structure of learning changes qualitatively with repetition, and that repetition does more than merely increase the amount of information remembered. For example, performance on the verbatim recognition actually decreased with number of repetitions whereas creative problem solving performance greatly increased.

The results of the Bromage and Mayer studies are intriguing enough to suggest the potential power of repetition in increasing student learning, but there are many unanswered questions. The present study furthers the research on repetition by using an actual classroom with college-level reading assignments rather than the previous taped lectures, and a subject matter other than technical science material. Second, a more realistic delayed testing rather than immediate testing after learning was used. Third, this study investigated the possibility that the benefits of repetition are affected by reading ability. Finally, questions at the six levels of Bloom's Taxomony were used as dependent measures in order to reflect more differential learning of specific types of textual information.

Thus the purpose of this study was to investigate the relationship between college student reading comprehension ability (high or low) and various amounts of repetitive reading of an assigned passage (one, two, or three times) on the six levels of cognitive learning from textual material as measured by Bloom's Taxonomy (1956).

Subjects were 103 college students enrolled in an Educational Psychology course. During the first experimental session, each student took the Comprehension section of the Nelson-Denny Reading Test (1967) in order to assess their reading ability. Students scoring at or above the median

raw score of 12 were classified as high-ability readers, and students scoring below 12 were classified as low-ability readers.

In the second experimental session, students were randomly assigned to read a 1525-word article entitled "The Lisbon Earthquake" (Kropp, Stoker & Bashaw, 1966) the assigned number of one, two, or three times without writing on the article or taking any notes.

One week later an examination consisting of 48 possible points was given. There were eight multiple-choice quesitons worth one point each at the Knowledge-Analysis levels of Bloom, and essay questions worth a total of eight points each at the Synthesis and Evaluation levels.

Six treatment conditions resulted from the two independent variables were used: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. A 2 x 3 (Reading Ability x Number of Repetitions) unequal cell, multivariate analysis of variance was performed on the data.

This data indicated a significant main effect for number of repetitions ($F(12, 184) = 2.48$, $p < .05$). Separate univariate analyses were conducted for each of the six dependent variables. The univariate analyses indicated a significant effect for treatment for both Knowledge scores ($F(2, 97) = 6.96$, $p < .001$) and for Comprehension scores ($F(2, 97) = 3.53$, $p < .05$). Knowledge scores for students who read one, two, and three times were 3.00, 3.56, and 4.24 respectively. Comprehension scores were 3.09 for one repetition, 3.28 for two repetitions, and 3.91 for three repetitions. Post hoc Newman-Keuls tests for both Knowledge and Comprehension scores indicated that students who read three times scored significantly higher ($p < .05$) than students who read only once.

The univariate analysis also indicated there was a significant effect of treatment for Application ($F(2, 97) = 6.16$, $p < .005$) and for Analysis ($F(2, 97) = 3.60$, $p < .05$). Application scores for reading one, two, and three times were 2.21, 3.03, and 3.38. Analysis scores were 3.30, 3.31, and 4.06 for one, two, and three repetitions. A post hoc Newman-Keuls test for Application scores revealed that the students who read both two and three times scored significantly higher ($p < .05$) than students who read only once. The post hoc Newman-Keuls test for Analysis indicated that students who read three times scored significantly higher ($p < .05$) than students who read only once.

The univariate analysis for Synthesis and Evaluation were not significant. Also, there was no significant main effect for Reading Ability or for the interaction of Reading Ability and Number of Repetitions.

In addition, following the Mayer procedure, tests were conducted to compare the performance of students with one repetition versus two and with one repetition versus three at the Knowledge-Evaluation levels of Bloom. None of the differences found were significant.

This study provided replicative support for the fact that repetition increases recall performance. However, in contrast to the support for the qualitative effects of repetition found by Bromage and Mayer, the present study supported the quantitative hypothesis because there were no significant differential effects of repetition at various levels of learning. Instead the results indicated that learning improves generally with increased repetitions at all levels of the Bloom cognitive domain, and that there was a statistically significant increase in learning with increased repetitions at the Knowledge-Analysis levels.

"Practice makes perfect" is an old saying passed from parent to child by many generations of Americans. However the results of the present study provide new support for this old adage. If students want to learn more, it appears that they should engage in more repetitions of the learning material.

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